Considerations for a Touchscreen Visual Lifelog

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ABSTRACT
In this paper we describe the design considerations for a touchscreen visual lifelog browser. Visual lifelogs are large collections of photographs which represent a person's experiences. Lifelogging devices, such as the wearable camera known as SenseCam, can record thousands of images per day. Utilizing the approach of event segmentation to organize and present these images, we have designed an interface to present lifelog collections for touchscreen interaction, thus increasing accessibility for users.

Categories and Subject Descriptors
H.5 **[Information Interfaces and Presentation]**: User Interfaces - *screen design (e.g., text, graphics, color).*

General Terms
Design, Human Factors.

Keywords
Visual lifelog, touchscreen, SenseCam.

1. INTRODUCTION
Lifelogging is the automatic and passive capture of information using lifelog devices such as the SenseCam [1]. The SenseCam is a small camera worn around the neck which passively captures and stores images. It contains a number of onboard sensors (light, body heat, movement and temperature) which monitor changes in the wearer's environment triggering image capture. A built-in timer is also used to capture images at 30 second intervals. With over 5,000 photographs captured each day, the organization and display of this immense visual lifelog is challenging. One solution to this problem is "event segmentation", which is the automatic filtering of SenseCam images using the sensor data to determine appropriate groupings [2].

The intuitiveness of touchscreen has led to their widespread distribution, from public kiosks to mobile phones. The popularity of Apple's iPhone and iPad has shown that these displays are attractive to the general public. The simple finger-touch interaction is also suitable for novice computer users [3]. These aspects suggest that touchscreen browsers would be an ideal form of interaction for SenseCam users, many of whom are older or have cognitive impairments [4]. To date a touchscreen interface using this method has not yet been explored. This paper will outline the factors that were considered when designing touch interaction for a visual lifelog, which we deployed and evaluated with real-world users [5].

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2. DESIGN CONSIDERATIONS
Visual lifelogs present a challenge for designers as they need to represent the user's day accurately and in a user-friendly manner, without requiring the user to browse through up to 5,000 images per day. By combining user interaction guidelines set out by Maguire [6] and iterative user testing [5] of our prototypes, we developed a browser for SenseCam data (see fig.1) that allows for:

- easy interaction with the touchscreeen device
- automatic image organization into a sequence of events
- event-based navigation/browsing and detail drill-down.

2.1 User Interaction Considerations
There were a number of factors which needed to be considered when we were designing our touchscreen SenseCam browser. These factors came under the headings of Easy Interaction, Event-based Organisation, Navigation, and Other Issues.

Easy Interaction: Touchscreens allow direct finger-input which can be intuitive for users. Bad design however can present usability problems. For example, the layout of the screen is important as the user's hand can hide important features. Taking this into consideration we positioned our buttons in fixed locations around the central data display area, allowing constant visibility of the image data. Button size was also fixed to accommodate high precision pointing. A problem with finger touch interaction is the coverage of finger prints across the screen. Using a black background highlights these marks so instead we implemented a light background colour scheme. The use of colour has also been used to support navigation e.g. the orange button leading to an orange themed calendar screen.

Although text input should be kept to a minimum for touchscreens [6], our interface provides a virtual keyboard to allow users to annotate their events. As prolonged interaction can cause arm fatigue, we reduced the level of pointing by providing users with the option to view their images using a timed slideshow.

Event-based Organisation: The principle feature of the interface is a set of SenseCam images. Presenting too many images on one screen can reduce their impact [6] and consequently impact image size and increase user frustration. Therefore we integrated an

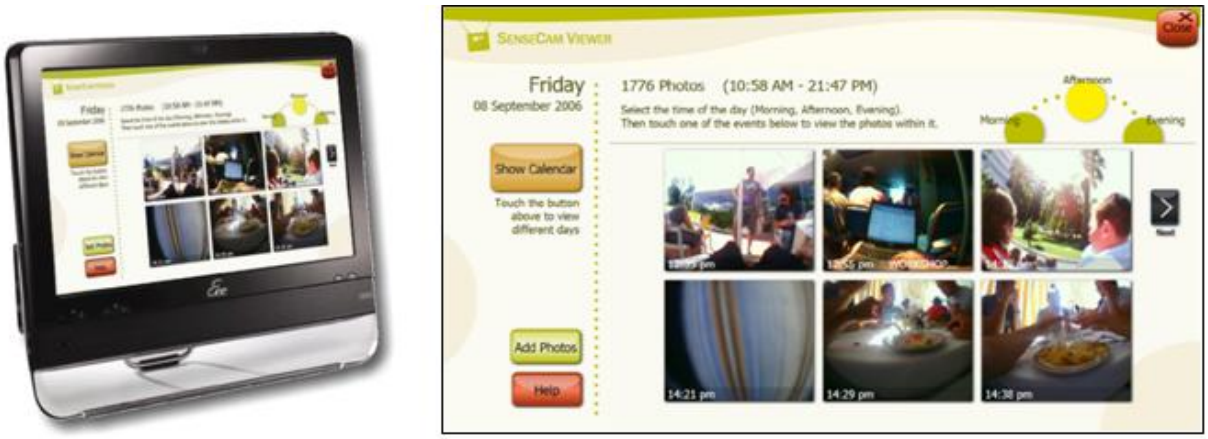

Figure 1. The visual lifelog interface (right), displayed on a touchscreen computer (left).

event segmentation model [2], which organizes a sequence of SenseCam images into a set of events (about 30 per day). Events represent daily activities such as walking, eating, shopping, talking, etc. Key-frame images representing the user's events are selected and displayed for each event, with six large key-frame images being selected automatically for each event. These key-frames are chosen to be temporally distributed throughout the event, so as to maximize glance-based impact. Since the event is the primary unit of browse and retrieval, the user can navigate, using the arrow buttons to earlier or later events. Alternatively they can navigate to a different time of the day; morning, evening or night by selecting the sundial element at the top-right of the screen. Doing so changes the set of events displayed.

Text is used in our interface to support many functions. Firstly, we have used text as a key component of the interface, whether for guidance or annotation. We have also used text to clarify button functions, as images may have different meaning for different people. Text is also used as a form of feedback, for example, to inform users that their images are uploading. Finally, since we are allowing user annotation, we are generating textual surrogates of each event, which will be used (along with the output of visual concept detectors) to support text-based querying at a later date.

Navigation: We chose a shallow navigation structure, appropriate for touchscreen interfaces, so that users would not get lost in complex menus. Navigation is hierarchical in nature, though we intend to incorporate hyperlinked navigation based on the similarity of events to one another. All of the screens have a short title to support the user's orientation through the application with clear information relating to their images (e.g., the date, time and number of images in the event). When drill-down occurs into an event, the new screen shows all the images of that event.

Other Issues: Visual lifelogs are personal recordings of a person's life and should be treated with sensitivity. Therefore we integrated two measures to ensure that users had control over their privacy. The first was a log-in screen requiring a username and password to view the SenseCam collections and the second was a 'delete photo' function. Users may want to share their SenseCam images with friends or family so allowing them to easily delete inappropriate photographs increases usability.

3. CONCLUSION

We have outlined some of the considerations that we have employed in the development of a touchscreen visual lifelog interface. We also feel that these considerations would transfer into other types of media, not just visual lifelogs. Specific to lifelogs, we have addressed the issue of media quantity by employing a model of event segmentation approach [2] to facilitate the organization of the large visual lifelog collections and to allow for easier browsing and retrieval. We have employed these design considerations in a successful real-world evaluation of touchscreen interfaces to visual lifelogs for users who may not be computer proficient [5].

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